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U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

PRE-APPEAL BRIEF REQUEST FOR REVIEW

Docket Number (Optional)

I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to "Mail Stop AF, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450" [37 CFR 1.8(a)]

on ______________________

Signature ______________________

Typed or printed name ______________________

Application Number	Filed
First Named Inventor	
Art Unit	Examiner

Applicant requests review of the final rejection in the above-identified application. No amendments are being filed with this request.

This request is being filed with a notice of appeal.

The review is requested for the reason(s) stated on the attached sheet(s).
Note: No more than five (5) pages may be provided.

I am the

☐ applicant/inventor.

☐ assignee of record of the entire interest.
See 37 CFR 3.71. Statement under 37 CFR 3.73(b) is enclosed.
(Form PTO/SB/96)

☐ attorney or agent of record.
Registration number ______________________.

☐ attorney or agent acting under 37 CFR 1.34.

Registration number if acting under 37 CFR 1.34 ______________

____
Signature

____
Typed or printed name

____
Telephone number

____
Date

NOTE: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required.
Submit multiple forms if more than one signature is required, see below*.

☐ *Total of ________ forms are submitted.

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Daniel Watson

Serial Number: 10/783,933

Filed: February 20, 2004

Entitled: THERMALLY TREATED POLYCRYSTALLINE DIAMOND (PCD) AND POLYCRYSTALLINE DIAMOND COMPACT (PDC) MATERIAL

Confirmation Number: 7269

Examiner: HENDRICKSON, Stuart L.

Group Art Unit: 1793

Attorney Docket Number: 1157.008

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Commissioner for Patents
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Alexandria, VA 22313-1450

REASONS UPON WHICH REVIEW IS REQUESTED

Applicant has filed a notice of appeal, and is requesting pre-appeal brief review. Applicant believes that the 35 USC §103(a) rejection of Claim 1 of the present application as unpatentable over *Lundin et al.* (5,103,701) taken with *Li et al.* (6,609,963) is improper. Applicant further believes that the 35 USC §103(a) rejection of Claim 1 as unpatentable over *Fang* (6,319,460) is improper. Applicant additionally believes that the 35 USC §102(b), or alternatively, §103(a) rejection of Claim 1 as anticipated or obvious over *Villela-Jirau* (6,030,596) is improper.

Applicant filed an amendment and response on January 21, 2008, to teach a toughened material that comprises a polycrystalline diamond material integrated with a second material, wherein the second material comprises a substantially continuous matrix in which granules of the polycrystalline diamond material are dispersed, and wherein the second material has a degree of ductility that is greater than that of the granules of the polycrystalline diamond material dispersed within the substantially continuous matrix.

Applicant's Claim 1 teaches a toughened material comprising a polycrystalline diamond material integrated with a second material, which can include iron, iron alloys, copper, copper alloys, a carbide, a ceramet, or combinations thereof. (Paragraph [00032]) The second material comprises a substantially continuous matrix in which granules of the polycrystalline diamond are dispersed, the second material having a degree of ductility greater than that of the granules of the polycrystalline diamond material. (Paragraph [00015])

The toughened material is formed by a process that includes subjecting the polycrystalline diamond material to multiple alternating cryogenic and heated tempering cycles, using specified target temperatures and controlled temperature rates of change. (Paragraph [0007])

The resulting toughened material has improved structural and material characteristics that include increased strength and toughness, and lowered brittleness. (Paragraphs [00027] and [0004]) The enhanced structural and material characteristics are obtained through use of the alternating cryogenic and heated tempering cycles, using temperatures and temperature rates of change that avoid over-stressing the polycrystalline diamond material or causing fractures. (Paragraphs [00021] and [00024])

Lundin et al. describe an apparatus for machining metals that detrimentally react with diamond cutting tools, in which the workpiece and diamond cutting tools are chilled to reduce wear on the diamond cutting tools. (*Lundin et al.*, Abstract)

Lundin et al. do not describe an unstressed toughened diamond material without fractures that possesses improved structural and material characteristics, which Applicant obtains by subjecting a polycrystalline diamond material integrated with a second material to alternating cryogenic and thermal tempering cycles.

Lundin et al. do not teach a second material having a substantially continuous matrix in which granules of the polycrystalline diamond material are dispersed, nor do *Lundin et al.* teach the second material having a degree of ductility greater than that of the granules of polycrystalline diamond material.

Lu*ndin et al.* teach only chilling a diamond tipped cutting tool and do not describe the components of the tool or improved structural characteristics resulting from the chilling.

Li et al. describe an abrasive tool that includes a superabrasive grain component, a filler component, and a vitreous bond component. (*Li*, Column 1, Lines 35-55) The abrasive tool is useable to grind polycrystalline diamond tools. (*Li*, Column 5, Lines 47-55)

Li et al. fail to teach an unstressed toughened diamond material without fractures that possesses improved structural and material characteristics, which Applicant obtains by subjecting a polycrystalline diamond material integrated with a second material to alternating cryogenic and thermal tempering cycles.

Li et al. also do not teach a second material having a substantially continuous matrix in which granules of the polycrystalline diamond material are dispersed, wherein the second material has a degree of ductility greater than that of the granules of polycrystalline diamond material.

Fang describes a super-hard composite material that includes a super-hard component and a metal matrix component, that has been compacted to an actual density of at least 95% of the theoretical maximum density of the mixture. (*Fang*, Column 2, Lines 48-57) *Fang* describes that materials such as diamond or cubic boron nitride are distributed in the metal matrix, and that the super-hard composite has a higher toughness and reduced wear resistance versus similar composites. (*Fang*, Column 3, Lines 9-16)

Fang fails to teach an unstressed toughened diamond material without fractures that possesses improved structural and material characteristics, obtained by subjecting a polycrystalline diamond material integrated with a second material to alternating cryogenic and thermal tempering cycles.

Fang instead teaches a diamond or cubic boron nitrate – metal matrix compound that has high fracture toughness, achieved through compacting super-hard component with a metal matrix component. *Fang* does not teach the additional properties of decreased brittleness or a lack of fractures caused by stress from the creation process, which Applicant's toughened material exhibits due to the use of specified target temperatures and controlled temperature rates of change.

Villea-Jirau describes a method for synthesizing diamonds from carbon using copper as a solvent. (*Villea-Jirau*, Column 1, Lines 10-15) Under a pressure of up to

100,000 psi, while heating to 700-720 degrees Centigrade, the carbon crystallizes into the copper. (*Villa-Jirau*, Column 1, Lines 50-56 and Column 2, Lines 46-51)

Villea-Jirau fails to teach an unstressed toughened diamond material without fractures that possesses improved structural and material characteristics, which Applicant obtains by subjecting a polycrystalline diamond material integrated with a second material to alternating cryogenic and thermal tempering cycles. *Villea-Jirau* teaches only the synthesis of a diamond, using high pressure and a copper-based solvent.

Applicant's use of alternating cryogenic and thermal tempering cycles prevents stressing or fracturing of the diamond material, which can occur under high pressure, or through use of heating cycles alone. Further, Applicant's specified target temperatures and controlled temperature rates of change result in the formation of a toughened material with improved structural characteristics.

The art of record fails to teach a toughened material with improved structural characteristics, as taught by Applicant.

Applicant therefore believes that Claim 1 teaches past the art of record and is in condition for allowance, and such allowance is respectfully requested.

Reconsideration of this application in light of the above arguments is respectfully requested.

Respectfully submitted,

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Date: June 17, 2008

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